

DAC0 and DAC1 Closed Loops

MR RF Local Applications

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The two local applications DAC0 and DAC1 perform simple closed loop algorithms needed in the Main Ring RF systems. DAC0 regulates the injection offset for the ferrite bias supply. DAC1 regulates the high energy offset for the ferrite bias supply.

DAC0

At a certain time in the rf cycle (of length 2.5 seconds, in the case of collider operation), about 50 μ s after the phase detector trigger time, the phase detector error signal is sampled. If the value is more than 0.5 volts away from the nominal 0.0 volt level, then adjust the controlling D/A by 80 mv per volt of error to correct for the error. The adjustment is in an algebraically positive direction for a positive error.

A bit is set on the occurrence of the phase detector trigger signal, and the sample and hold circuit is triggered 50 μ s after that time to measure the error signal.

DAC1

When the rf turns off each cycle, measure the change in the ferrite bias supply current waveform. If the bias supply program is more than 2.5 volts, and if the bias supply is on and the modulator is on, then adjust the high energy bias supply offset. The amount of the offset is proportional to the measured change and is only to be made if the change is greater than 0.015 volts. In terms of volts, the adjustment should be in the opposite direction and of a value 1.3 times the measured change. This should produce a 0.7 times compensation, so that only a few adjustments should be needed to correct for a significant error.

Three digital input bits are used to furnish the rf "on" status, the bias supply "on" status, and the modulator "on" status. The bias supply program is one analog channel. The current waveform is the other one that is sampled twice to get the change. When the rf "on" status bit goes to the "off" state, the previous (15 Hz) cycle's reading of the bias supply current waveform is subtracted from the present value to get the change. As an example, if the observed change in the current waveform is 0.040 volts, an adjustment of 0.080 volts in the D/A is needed to correct it.